DORIS satellite phase center determination and consequences on the derived scale of the Terrestrial Reference Frame

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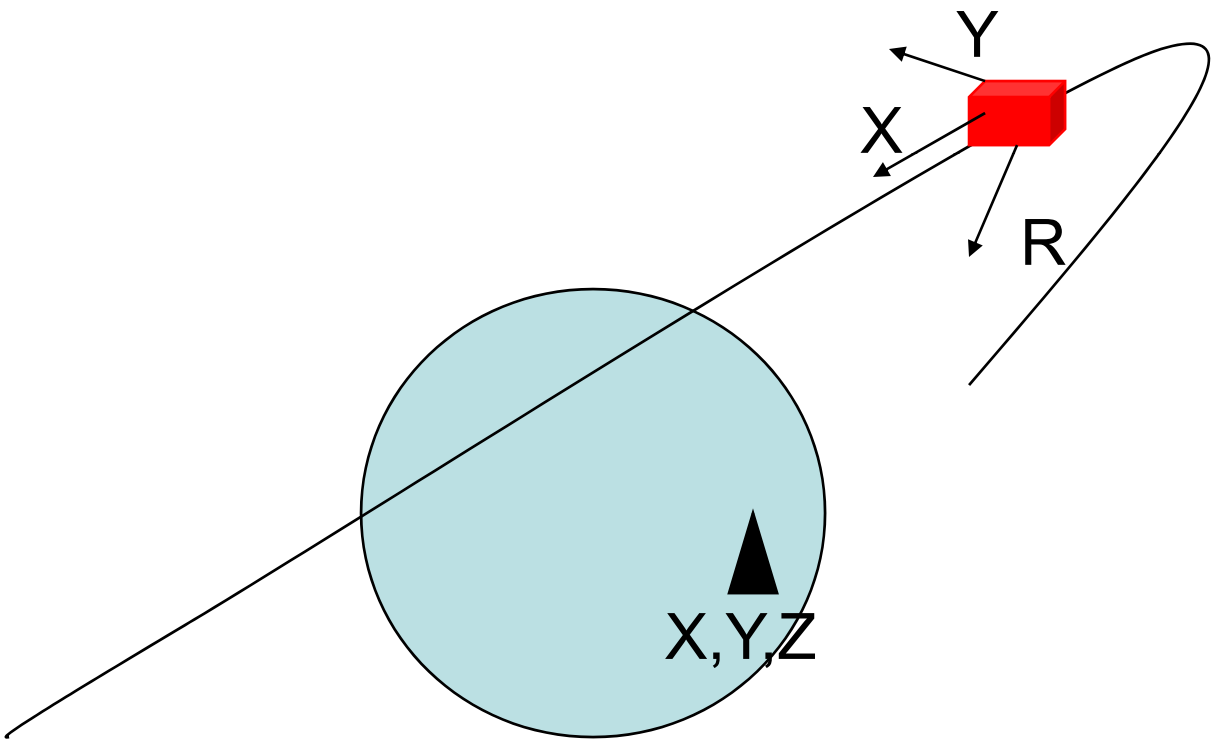
Goals

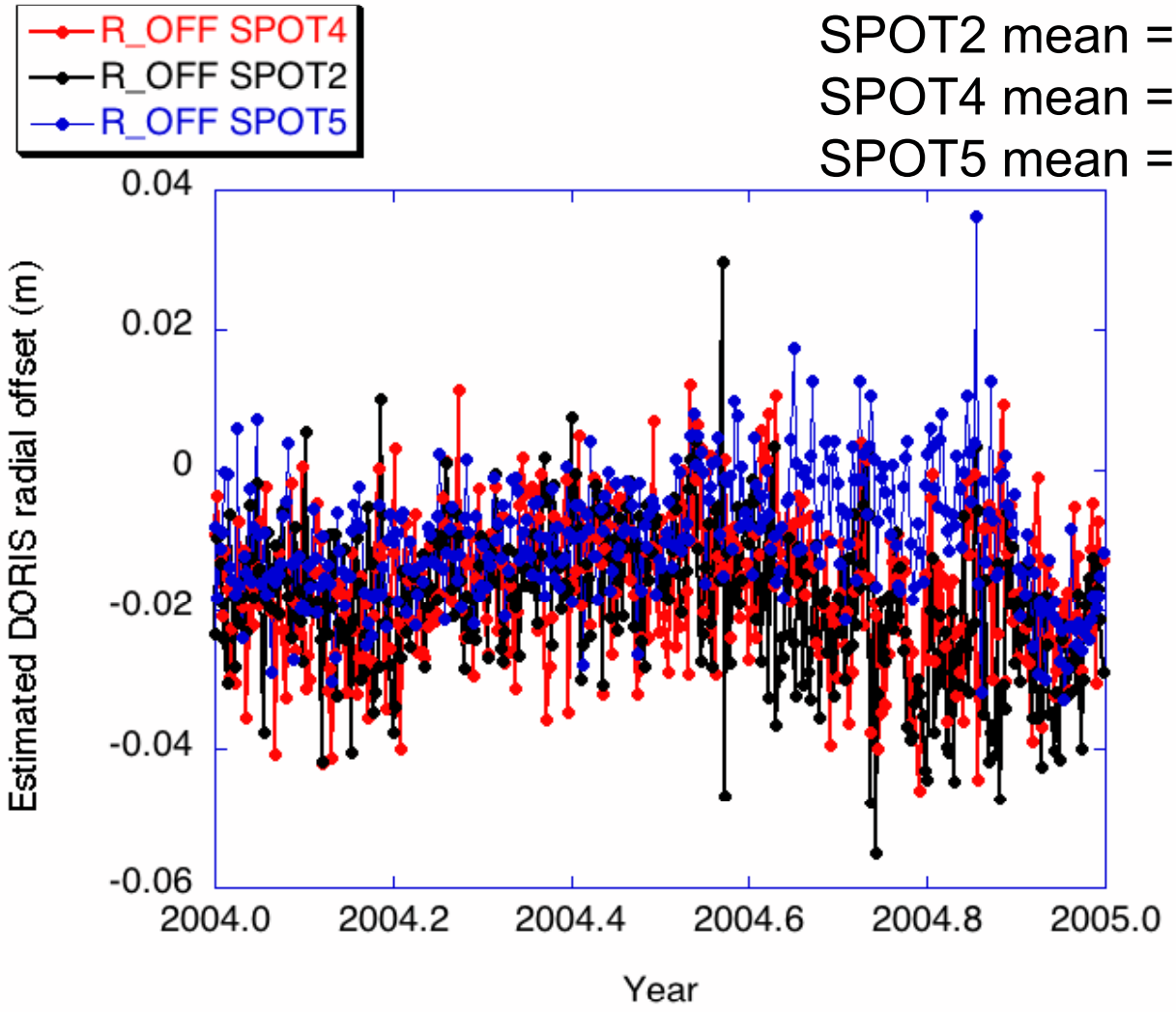
- Estimate DORIS satellite phase center offsets
  - Satellite-by-satellite basis
  - Daily determination over 1 year (2004)

- Compare DORIS to GPS estimates for common satellites
  - Jason and TOPEX/Poseidon

- Apply DORIS correction and investigate consequences
  - Terrestrial Reference Frame (TRF) geocenter and scale

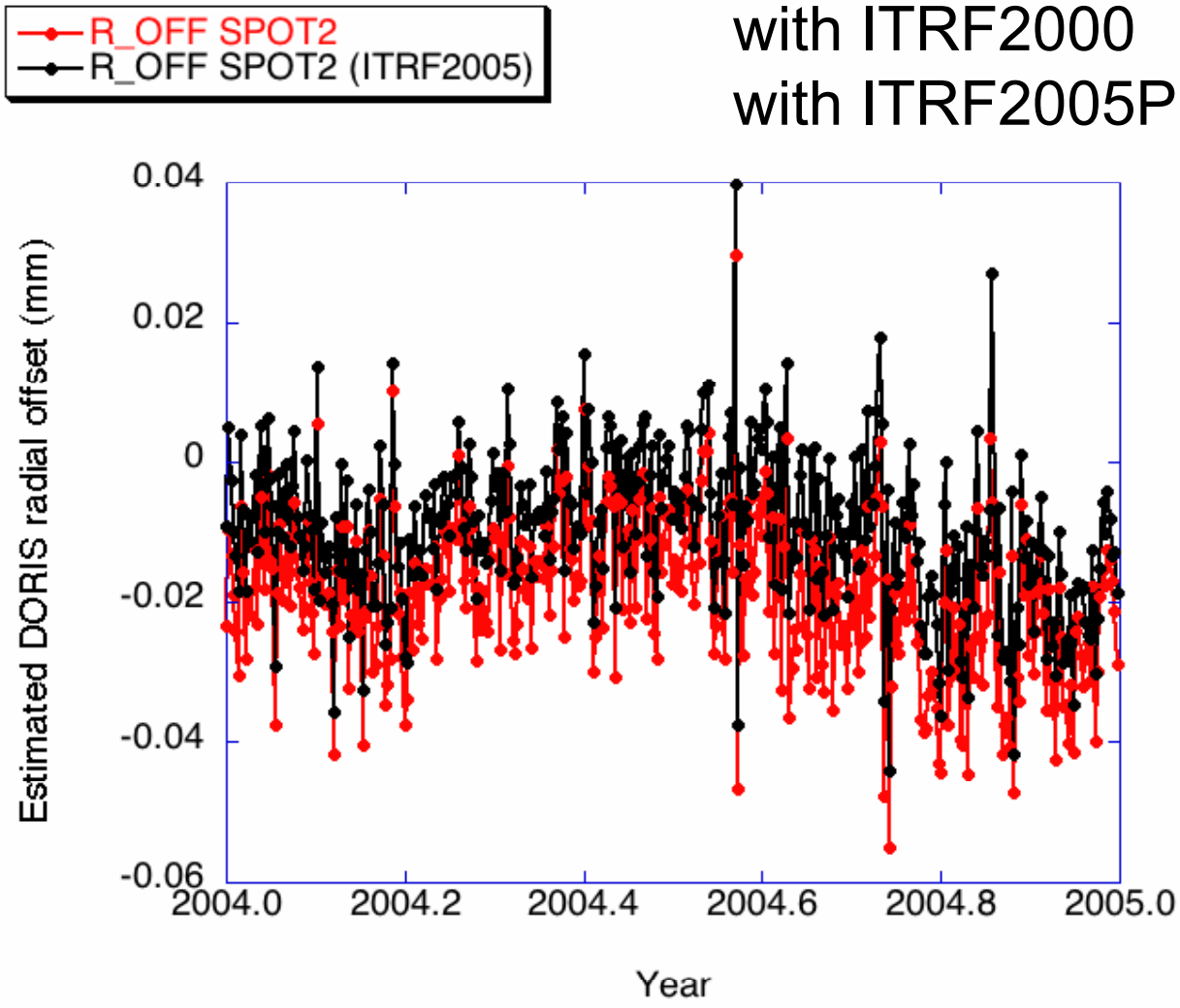
Estimating DORIS phase center offset (per satellite and per 24hr)





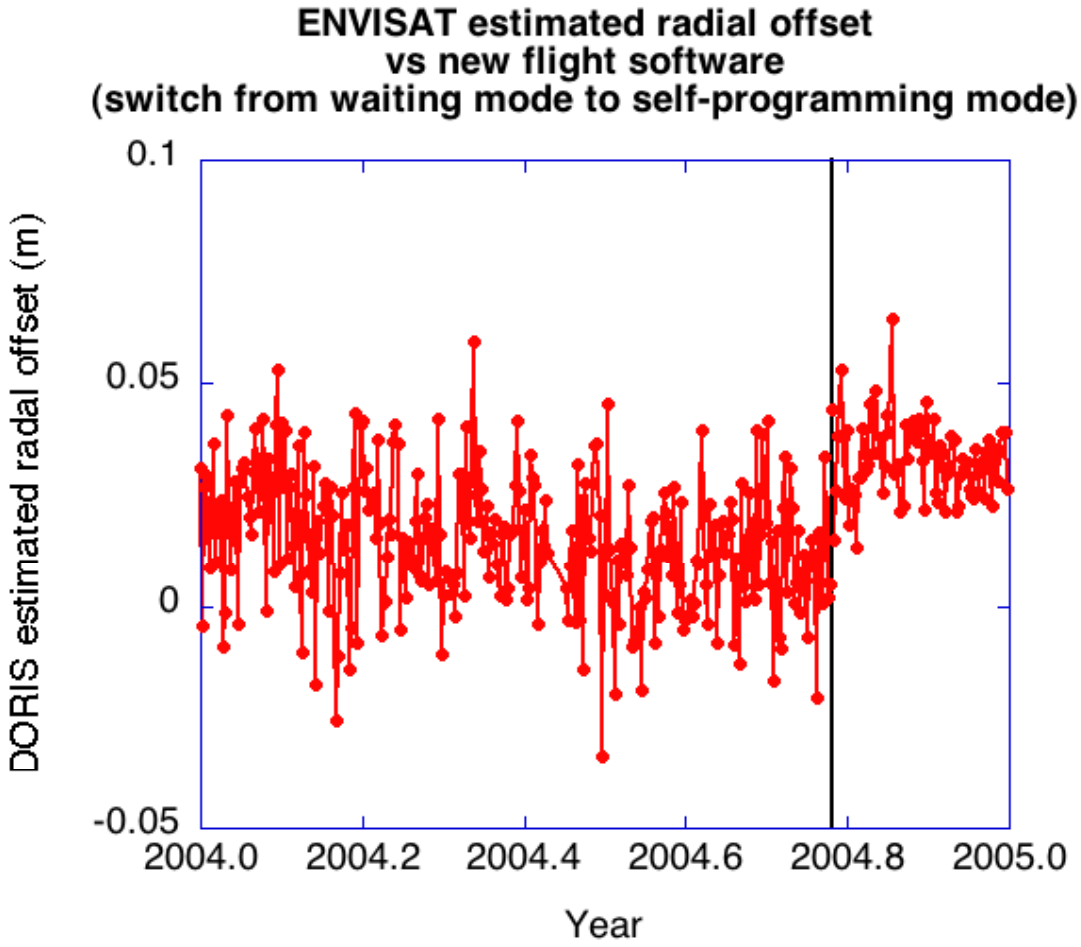
SPOT2 mean = -19 mm
SPOT4 mean = -17 mm
SPOT5 mean = -10 mm

ITRF2000



with ITRF2000 = -19 mm

with ITRF2005P = -10 mm



ITRF2000

See also Doornbos and Willis, Acta Astronaut., in press

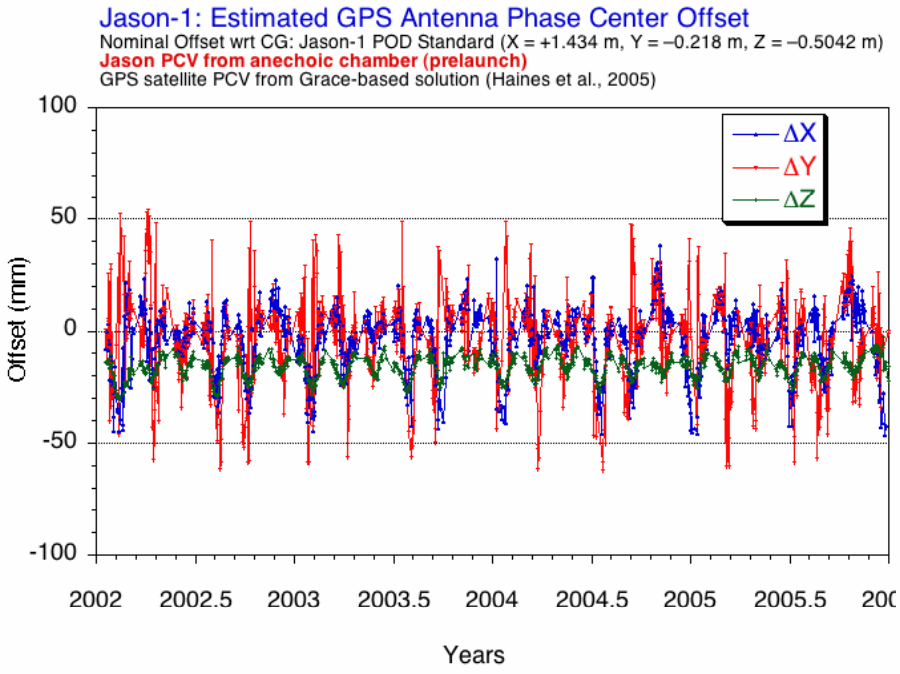
Estimated DORIS mean offsets (in 2004) using ITRF2000

	X_OFF (mm)	Y_OFF (mm)	R_OFF (mm)
ENVISAT (*)	-24	N/A	19
Jason (**)	2	17	-37
SPOT-2	N/A	-13	-19
SPOT-4	N/A	-17	-17
SPOT-5	N/A	2	-10
TOPEX/Poseidon	5	-17	-24

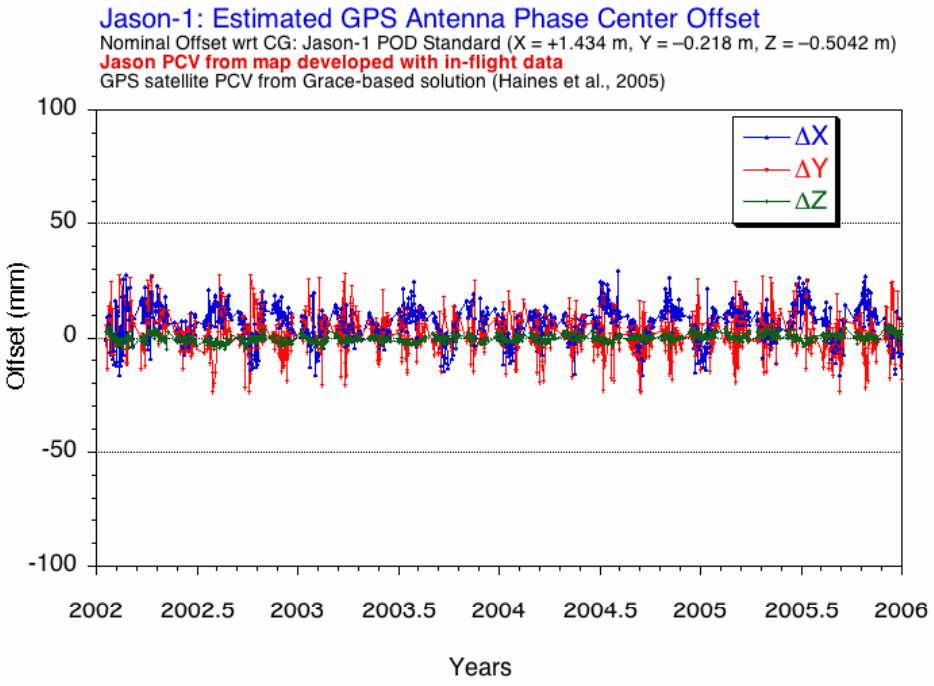
(*) different orientation convention (**) affected by SAA

GPS-only results

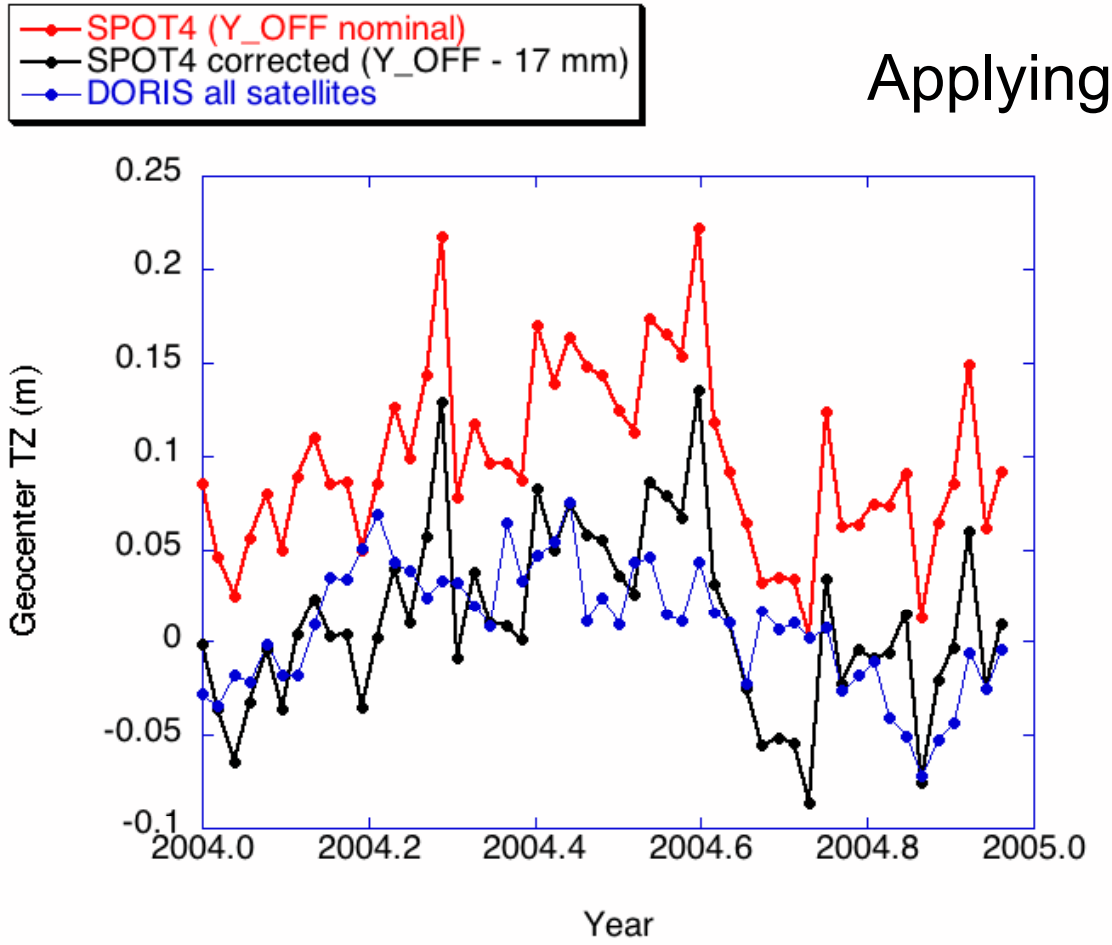
Using anechoic chamber values



Using GRACE-derived values



Applying DORIS corrections



For correlation between Y_OFF SPOT and TZ-geocenter, see Willis et al., J. Geod., 2006

Applying DORIS phase center correction and estimating ground station coordinates

Geocenter: < 1 mm difference

Scale: -2.5 ppb --> -0.5 ppb

XYZ residuals: 1-2% improvement

CONCLUSIONS

DORIS phase center corrections were derived
for all DORIS satellites in 2004

All DORIS satellites show a 10-20 mm radial offset
(linked with TRF scale) that are significantly reduced with ITRF2005P

All SPOT satellite show < 20 mm cross-track offset
(linked with TRF Z-component for SPOTs)

GPS-DORIS corrections are not similar and can vary broadly
(ITRF2000 vs ITRF2005 for DORIS and PCV models for GPS)

Important impact on TRF (geocenter and scale)

Small improvement on station coordinates accuracy